

1 Claims

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3 1. A parking brake actuator mechanism for setting and releasing an
4 automotive brake comprising:

5 a reversible drive motor having a rotary output gearing;
6 a pivot member driven by said drive motor output and mounted to be pivoted
7 about a rotary support in an actuator housing in either direction;
8 a cable wind up wheel rotatably supported in said housing and having an operator
9 a cable wrapped onto a perimeter of said wind up wheel to be wound up thereon upon rotation in
10 one direction and unwound therefrom upon rotation in an opposite direction;

11 a clutch establishing a driving connection between said pivot member and said
12 wind up wheel upon rotation of said motor in a brake apply direction;

13 said clutch including a release feature and said actuator mechanism including a
14 fixed disengagement feature located to engage said clutch disengagement feature and cause
15 consequent disengagement of said clutch upon continued rotation of said pivot member in a
16 release direction.

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18 2. An actuator mechanism according to claim 1 wherein said clutch
19 comprises a wrapped spring clutch having an arm connected to said pivot member and windings
20 wrapped over a drum surface on said wind up wheel, said spring clutch establishing a rotary
21 driving connection between said pivot member and said wind up wheel by gripping of said drum
22 surface.

1 3. An actuator mechanism according to claim 1 further including a
2 pretensioned torsion developing spring connected at one end to said wind up wheel to urge said
3 rotation thereof in a direction to create tensioning of said cable, said torsion developing spring
4 anchored at another end relative said pivot member, whereby upon release of said clutch, said
5 prewound torsion developing spring tensions said cable by urging wind up of said winding
6 wheel.

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8 4. An actuator mechanism according to claim 1 wherein said motor driven
9 output gearing is self locking to hold said cable in tension upon deactivating said motor.

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11 5. An actuator mechanism according to claim 4 further including a load
12 sensor producing signals corresponding to said cable tension, and a control circuit connected to
13 said load sensor deactivating said motor in response to receipt of a signal produced by a cable
14 tension indicating a brake set condition.

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16 6. An actuator mechanism according to claim 1 further including a position
17 sensor sensing the extent of releasing rotation of said pivot member and a motor control circuit
18 connected to said sensor causing said motor to be deactivated after sufficient releasing rotation to
19 insure engagement of said disengagement feature with said fixed feature upon continued rotation
20 of said wind up wheel to disconnect said driving connection of said pivot member to said wind
21 up wheel.

1 7. An actuator mechanism according to claim 6 further including a prewound
2 torsion developing clock spring connected at one end to said wind up wheel to urge said rotation
3 thereof in a direction to create tensioning of said cable, said torsion developing clock spring
4 anchored at another end relative said pivot member, whereby upon release of said clutch, said
5 prewound torsion developing clock spring tensions said cable by urging wind up of said winding
6 wheel.

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8 8. An actuator mechanism according to claim 2 further including an auxiliary
9 drum connected to said pivot member and located adjacent to said wind up wheel drum surface
10 and having a drum surface matched thereto said wind up wheel drum surface so that said spring
11 clutch grip both of said drum surfaces to reduce wear on said wind up wheel drum surface.

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13 9. An actuator mechanism according to claim 1 further including a manual
14 release element selectively movable to disengage said clutch by engagement with said clutch
15 disengagement feature.

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17 10. An actuator mechanism according to claim 9 further including a torsion
18 developing clock spring connected at one end to said wind up wheel to urge said rotation thereof
19 in a direction to create tensioning of said cable, said clock spring anchored at another end relative
20 said pivot member, whereby upon release of said clutch, said pretensioned torsion spring tensions
21 said cable by urging wind up of said winding wheel.

1 - 11. An actuator mechanism according to claim 2 wherein said wind up wheel
2 is rotatable upon a drive shaft extending to said pivot member and drivingly mated to a hole in
3 said pivot mechanism to establish a rotary connection therewith.
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5 12. An actuator mechanism according to claim 11 further including an
6 auxiliary drum having a hole through which said drive shaft extends with a mating interfit
7 therebetween creating a driving connection, said auxiliary drum having a drum surface matching
8 said wind up wheel drum surface and adjacent thereto, said spring clutch received over both of
9 said drum surfaces.
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11 13. An actuator mechanism according to claim 5 wherein said load sensor is
12 connected to said cable to measure the tension therein.
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14 14. An actuator mechanism according to claim 5 wherein said load sensor is
15 associated with a rotary support for said wind up wheel and measures a reaction force caused by
16 said cable tension.
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18 15. An actuator mechanism according to claim 5 wherein said load sensor
19 comprises a strain gauge mounted to a bracket supporting a rotary support for said pivot member.
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21 16. An actuator mechanism according to claim 3 wherein said wind up wheel
22 has a cylindrical cavity formed therein and wherein said tensioning spring comprises a clock

1 spring disposed in said winding wheel cavity.

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3 17. An actuator mechanism according to claim 16 wherein said clock spring
4 has an outer winding connected to a cylindrical outer wall defining said cavity.

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6 18. An actuator mechanism according to claim 16 further including a drive
7 shaft extending through said winding wheel which is freely rotatable thereon, said drive shaft
8 extending to said pivot member and engaged therewith to establish a rotary connection, said
9 clock spring having an inner winding connected to said drive shaft.

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11 19. An actuator mechanism according to claim 1 wherein said pivot member
12 comprises a sector gear and said motor output includes a pinion gear engaged with said sector
13 gear.

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15 20. A method of actuating an automotive parking brakes comprising:

16 wrapping an operator cable connected to operate said parking brakes around a
17 rotatable wind up wheel;

18 drivingly connecting a reversible electrical motor to said wind up wheel to enable
19 winding or unwinding of said operator cable therefrom by selective operation of said motor in
20 either direction;

21 sensing the level of loading of said operating cable when operating said motor in a
22 direction winding up said cable to apply said parking brake;

1 deactivating said motor upon reaching a predetermined sensor loading of said
2 cable; and

3 holding said cable in said load condition after deactivation of said parking brake;
4 and

5 deactivating said motor after operation of said motor in a direction unwinding said
6 cable to release said parking brake.

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8 21. The method according to claim 20 wherein rotating of said wind up wheel
9 by said motor is done through a normally engaged clutch, and said clutch is disengaged after
10 continued operation of said motor in a direction unwinding said cable to release said parking
11 brake, and further including reengaging said clutch upon rotation of said wind up wheel by
12 operation of said motor in a direction tending to wind up said operator cable.

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14 22. The method according to claim 21 including applying a constant torsional
15 force to said wind up wheel tending to wind up said operating cable thereon sufficient to
16 eliminate slack but not sufficient to apply said parking brake whereby when said clutch is
17 disengaged a pretensioning is created in said operator cable prior to engaging said clutch.

18
19 23. The method according to claim 22 including selectively manually
20 releasing said clutch to release said parking brake and reengaging said clutch upon activation of
21 said motor to reapply said parking brake.

1 24. The method according to claim 20 including sensing said cable loading by
2 sensing a reaction force at the rotational support of said wind up wheel.

3
4 25. The method according to claim 21 wherein said clutch is disengaged by a
5 predetermined extent of rotation of said wind up wheel in a cable unwind direction.

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7 26. The method according to claim 25 including sensing the position of said
8 wind up wheel when rotated in said unwind direction and deactivating said motor after sensing
9 an extent of unwinding motion sufficient to disengage said clutch.

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11 27. The method according to claim 20 wherein said driving motor is drivingly
12 engaged with a wind up wheel by a disengageable clutch, and wherein said clutch is released by a
13 manual lever to manually release said parking brake.